

## ***Interactive comment on “An urban ecohydrological model to quantify the effect of vegetation on urban climate and hydrology (UTC v1.0)” by Naika Meili et al.***

### **Anonymous Referee #1**

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**General Summary and Comments** This manuscript describes the development and testing of UT&C, an urban canyon model that incorporates the characteristics of roof vegetation, ground vegetation, and urban trees, including the capability to represent different plant types, and their effects on the urban environment. Comparison of model output to tower flux observations indicates good performance compared to other models. Importantly, the modeling of latent heat flux, the main focus of the model formulations in the current paper, is equal to or improved compared to other models. Sensitivity simulations indicate vegetation can decrease urban canopy temperature as expected. The manuscript is well-written and thoroughly recognizes previous work in this area. The model is comprehensively presented (a detailed description is provided

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in the Technical Reference Material document) and simulation results are thoroughly analyzed. I recommend that this study be published after considering the minor comments listed below.

#### Specific Comments

1. Abstract: Line 9: It is stated here that the model calculates all urban hydrological fluxes. However, as mentioned in the model limitations section, snow hydrology is not accounted for. So this statement should be modified. 2. Line 52: Change “Reasearch” to “Research”. 3. Line 55: CLM doesn’t have an explicit representation of short ground vegetation in the urban canyon. Rather it has a generic pervious canyon floor whose soil column supports evaporation. 4. Line 101: Is the model restricted to an hourly time step for any reason or is it flexible enough to accommodate finer time steps. For example, meteorological forcing data may be available at  $\frac{1}{2}$  or  $\frac{1}{4}$  hour time steps. Solution of soil moisture equations and conductive fluxes may benefit from a finer time step. 5. Line 173: This seems to imply that the interior building temperature is not a function of the conductive fluxes through the roof and walls and thus ignores external factors such as solar and longwave radiation impinging on roofs and walls and the transfer of that heat to building interior. Is this a reasonable assumption? Have the limitations of this assumption been explored in the cited paper (de Munck et al. 2018)? There is some reference as to the importance of this in lines 599-601, but there is no quantitative assessment of this offered. 6. Table 1: Generally, “u” and “v” are used to describe the wind components. Suggest changing “Velocity u” to “Wind Velocity w”. 7. Line 560: Suggest changing “the here reported relative humidity increase” to “the relative humidity increase reported here”. 8. Line 575: Change “framing” to “framing”. Or change to “helps to define reasonable expectations”. 9. Line 618: Change “explicitly” to “explicitly”. 10. Supplement, Line 1011: What is meant by “canyon calculation height”? Is this the height at which the air temperature calculated? Aren’t there two heights calculated?

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